Report to the New York State Department of Environmental Conservation

Common Tern (*Sterna hirundo*) Research and Management

Oneida Lake, New York 2015

Prepared by

Wynne Hannan, Student Intern

Dr. Elizabeth Craig & Dr. Paul Curtis, Supervisors

Department of Natural Resources, Cornell University, Ithaca, NY 14853

Introduction & Background

The Common Tern (*Sterna hirundo*) is listed as a threatened species in New York State. This is largely due to the loss of suitable nesting habitat which is strongly correlated with landfill-subsidized increases in gull populations because gulls also compete for similar nesting space (Mattison, 2006). The Common Tern colony at Oneida Lake also faces these issues, and has historically been reduced to one nesting island on the lake, Little Island, which is reserved annually for the tern colony by researchers at the Cornell Biological Field Station. Cornell University staff have monitored and managed the colony since 1976, and continue implementing methods such as chick banding, adult recapture, and habitat enhancement, including chick shelters and providing additional nesting substrate. These management practices continued and expanded during the 2015 field season. In addition to Little Island, Wantry and Willard Islands were monitored as nesting sites for the Common Tern. Although Little and Wantry Islands have received attention by staff, Willard was colonized without our intervention. There were 2 main foci this year, the first of which was the facilitation of expanding the Common Tern habitat to Wantry Island by setting out decoys, excluding other birds, and making it a suitable nesting ground. Secondly, we captured 7 of the 10 geolocator birds deployed last year, analyzed the data they returned, and released an additional 5 marked terns to be recaptured next year. The goals of the Cornell University research and management efforts were focused on increasing area for nesting, and consequently raise tern numbers to sustain a stable, self-perpetuating inland tern colony. The NYSDEC management goal for the Oneida Lake population is to reach stability with at least 500 nesting pairs per year. Due to Little Island's limited nesting space, this management goal is sporadically achieved. Hopefully with a portion of Wantry Island as a new nesting ground, as well as the data collected from the geolocators, we can learn more about these birds and understand the conditions that will provide them with the greatest chance for success. Restoring the Common Tern to its native habitat enhances biological diversity and allows for the persistence of a species with its own intrinsic value.

Methods

Gull Exclusion Grid

Traditionally Cornell erected a seasonal 20-lb-test (9. 07 kg) monofilament grid in early April that is intended to reserve the island for the Common Terns, and it was taken down once the terns have established themselves. This year we used a new type of wire (electric fence poly-wire) in order to reduce the entanglement of birds in the grid. This also allowed us to leave the grid up during the entire nesting season, as opposed to previous years when we have taken the grid down. Our reason for this was to exclude gulls and other potential predators which might have been responsible for recent reproductive issues in the colony. This year grids were placed on both Wantry and Little Islands. These grids prevent larger birds such as gulls from colonizing the island and provide some space and protection for the terns. Additionally the grid was used as reference for mapping nesting locations.

Nest Labeling

We created nest flags using numbered marking tape tied to short metal stakes (Figure 1). We placed one flag next to each nest to keep track of the progress and fate of these nests. We recorded nest contents by returning to Little, Wantry, and Willard Islands several days each week via small motorboat. Each nest was mapped using the gull exclusion grid that sectioned Wantry and Little Islands, and from north to south on Willard. On Little Island, we took particular note of marked nests that had adult terns with newly-attached geolocators. We also monitored marked nests so that we did not accidentally recapture the same adult terns.

Chick Banding

We banded all the tern chicks we could find on the nesting island, and used aluminum leg bands provided by the USGS Bird Banding Laboratory. We placed the aluminum band on the right leg of each chick, and we recorded the bird's age. We also recorded the age and number of dead chicks found during each visit to the island, and whether the dead chicks were banded or not.

Adult Recaptures

We recaptured adult Common Terns using walk-in traps, and recorded their band numbers. Walk-in traps were effectively used to capture adults incubating eggs. The PVC- frames covered with mesh netting (Figure 2) were set over nests. The adults entered through a small hole on one side in order to incubate their eggs. We then approached quickly, removed the bird from the trap, and recorded its band number. Recapturing banded adult terns will be important for understanding the survivorship, age distribution, and nest-site fidelity for the Oneida Lake colony.

Camera Monitoring

In order to monitor conditions on Little Island when we were not present, we setup 2 cameras in the center of the island. One camera facing north took a photo every hour during daylight. Then an infrared camera facing south took a picture as triggered by a motion sensor. In particular, we were looking to identify predators and possible causes of night-time abandonment which could have caused poor reproductive success during 2014.

Geolocators

This was our third year using geolocators, and we placed the geolocator affixed to a green plastic band on the left leg of 5 different adult terns (Figure 3). Each tern we marked with a geolocator was previously marked with a USFWS aluminum leg band, and was actively nesting at the time of capture. To recapture 2014 geolocator birds, we scanned the air for birds with an orange geolocator affixed to their leg and traced it back to its nest. We then used the above recapture method to retrieve the bird and geolocator. We also recorded the USFWS band number, head-bill length, wing length, culmen length and diameter, when attaching and removing the geolocators to each tern.

Weather & Water Levels

We recorded weather conditions and water levels each time we visited the islands. In 2015 there were many large storms on the lake and notable changes in water levels.

Preparing Wantry Island

In order to make Wantry Island an appealing nesting ground for the terns, decoys were set out to attract nesting pairs (Figure 4). In addition to the gull exclusion grid, a total of 4 gull eggs were tossed, and 18 nests of gulls dismantled on the north side of the island to give the terns space. Grass clippings were also spread around the island to provide nesting material for the birds. The spreading of grass clippings was also done on Willard Island (Figure 5).

Other Colonial Waterbird Monitoring

Our research also included monitoring the other colonial waterbird populations on Oneida Lake. We monitored Ring-billed Gulls (*Larus delawarensis*), Herring Gulls (*Larus argentatus*), Great Black-backed Gulls (*Larus marinus*) and Double-crested Cormorants (*Phalacrocorax auritus*) on Wantry, Willard, Little and Long Islands. We performed weekly offshore counts of these birds as we approached the islands via boat. Unlike Common Terns, these birds tend to flush easily. We also banded Herring Gull chicks on Wantry Island, and all 3 gull types on Long Island. There was no successful nesting of cormorants because of hazing and egg oiling conducted by NYSDEC staff.

Results

Gull Exclusion Grid

The gull exclusion grid was effective at preventing gulls from nesting on Little and Wantry Islands. We did destroy gull nests on the far north side of Wantry Island that were outside of the grid coverage. One gull died on Wantry Island after getting tangled in a fallen section of the gull exclusion grid damaged by a storm.

Adult Common Tern Recaptures

We recaptured 32 adult Common Terns, 28 of which were banded. The age distribution for birds captured this season was similar to that for past years (Figures 6 & 7) made up mainly of birds ages 8-10 years old. All but 1 of the banded, captured birds was from Oneida Lake. A 10-year-old originally banded in Buffalo Harbor was also captured.

Nesting Data for the Common Tern Colony

The peak count was 339 tern nests on Little Island during the 2015 field season (Figure 8). The peak nest count for Wantry and Willard Island were 70 and 54 nests, respectively (Figure 9 & 10). One chick was banded on Little Island, but was not observed again after 2 weeks. A second chick (fledged) was observed in August, but was unbanded. There was a 50% chick survival rate (*n*= 2) across all islands, and less than a 0.4% hatch rate. On Little Island, there were signs of predation with eggs splattered on surrounding vegetation, as well as holes in egg shells (Figure 11). There were also many intact eggs that never hatched, likely indicating more night-time abandonment issues, this is supported by our camera findings.

Camera Monitoring

The cameras returned many interesting viewpoints of the island. The most notable image captured a Great Blue Heron (*Ardea herodias*), on Little Island at night, observed causing a flush of the colony (Figure 12). Further analysis of camera images will reveal the frequency of night-time flushing events.

Other Oneida Waterbird Counts

We conducted counts of Ring-billed Gulls, Herring Gulls, Great Black-backed Gulls, and Double-crested Cormorants throughout the summer. We banded 25 Herring Gull chicks on Wantry Island, and the following waterbird chicks on Long Island: 61 Ring-billed Gulls, 1 Great Black-backed Gull, and 9 Herring Gulls. The Oneida Lake cormorants did not produce successful nests this year, as nest attempts were destroyed by NYSDEC staff. This summer the DEC staff from Regions 6 and 7 were primarily responsible for cormorant counts, and they conducted weekly hazing activities.

Geolocators

We successfully deployed 5 geolocators on green plastic leg bands during 2015. We retrieved 7 of the 10 geolocators from the 2014 season, and downloaded the stored data. Three units returned with running batteries, 2 batteries had died just before recapture, and 2 others died just a few months in. From these data we were able to develop maps of the various locations of the

birds during the wintering period (Figure 13). There were 3 major stopover locations for the migration to and from the wintering grounds: the Chesapeake Bay area, southern coast of North Carolina, and Cuba (Figure 14, 15, 16). All birds with running geolocators stopped in at least one of these areas, and also had similar wintering locations on the central coast of Peru (Figure 17).

Wantry & Willard Island

We observed the first signs of terns on June 22nd with nests placed right up next to the decoys (Figure 18). After a stormy nesting season, the terns abandoned the island by the 9th of July. Grass clippings provided had been blown away, and decoys were buried by zebra mussel shells blown by strong wind and waves traveling over the island.

Discussion

This year, the Common Terns at Oneida Lake were unsuccessful in breeding on any of the islands. This was likely due to a combination of factors. First of all, this year was particularly stormy. Strong winds combined with water levels drastically rising and falling, caused the destruction of many nests. Secondly, the heron predation on Little Island caused direct damage to eggs and likely nighttime abandonment. This phenomenon is known to cause low hatch rates in tern colonies due to exposure of eggs. The cormorant hazing may have also added to the stress of the birds and reduced their success, but we have no direct measure of this. Finally, what was most clear was that these birds are limited by secure nesting space above high water.

Looking forward, we should focus on 3 key areas: predation issues, secure nesting habitat, and geolocator return data. In order to address predation issues, we may consider placing cameras on multiple islands earlier in the season so that predators can be recognized and managed before they cause too much damage to the nesting tern population.

The new nesting habitat on Wantry Island that we began to establish this year proved to have great potential. Understanding the likely factors limiting the birds' success, exposure to high wind and waves, we can continue to work with the landowner to establish a new nesting ground for the terns. This is of great importance as space seems to be one of the greatest limiting

factors in the tern's reproductive success. In order to protect this exposed island from the elements, we can look into planting vegetation to mitigate water level rise and block wind, while also hiding nests from predators. The tern decoys worked well in attracting nesting pairs, so establishing them on the island again would also be helpful.

Another way in which we can help expand the tern's habitat would be through the expansion of Little Island. In the past we have built platforms to do so, but their impermanence and maintenance requirements did not make it a sustainable solution. A more permanent solution could be to dump large amounts of material on the ice during winter so that when the ice melts, the island size will be expanded. Little Island has historically been the most successful nesting area, and if we can expand its size, additional rocky material will also reduce the impact of storm surges. We may also have enough space to install a predator-exclusion fence.

Finally, we are developing an exciting new database of information for this tern colony. Through the use of geolocators, we have the ability to observe not only where these birds go for winter, but their path, stopover locations, and even details on migration periods. The geolocators provide us with a completely new way of analyzing and understanding the behavior of the Common Tern. With this information we can hopefully better protect and help to restore their populations.

Literature Cited

Mattison, P. M. 2006 Quantifying disturbance factors and effects in common terns (*Sterna hirundo*) using visual, audio, and reproductive data. M.S. Thesis, Cornell University, Ithaca, NY.

Acknowledgements

Thank you to the New York State Department of Environmental Conservation for their continued support of Common Tern nesting activity on Oneida Lake. We would also like to thank Lars Rudstam, Randy Jackson, Brian Young, and other staff and students at the Cornell Biological Field Station, Shackelton Point, for assistance with procuring equipment, assisting with banding and bird counts, and overall support.

Figure 1. Plastic numbered flags and stakes used to mark Common Tern nests on Willard Island during summer 2015 at Oneida Lake, New York.

Figure 2. Traps used to capture adult Common Terns on nesting islands during summer 2015 at Oneida Lake, New York.

Figure 3. Common Tern with a geolocator attached to a green band on the left leg, trapped and released on Little Island during summer of 2015 at Oneida Lake, New York.

Figure 4. Decoys of Common Terns placed on Wantry Island at Oneida Lake, New York, during summer of 2015 intended to attract new nesting pairs.

Figure 5. Exposure of Wantry Island following storms during summer of 2015 at Oneida Lake, New York.

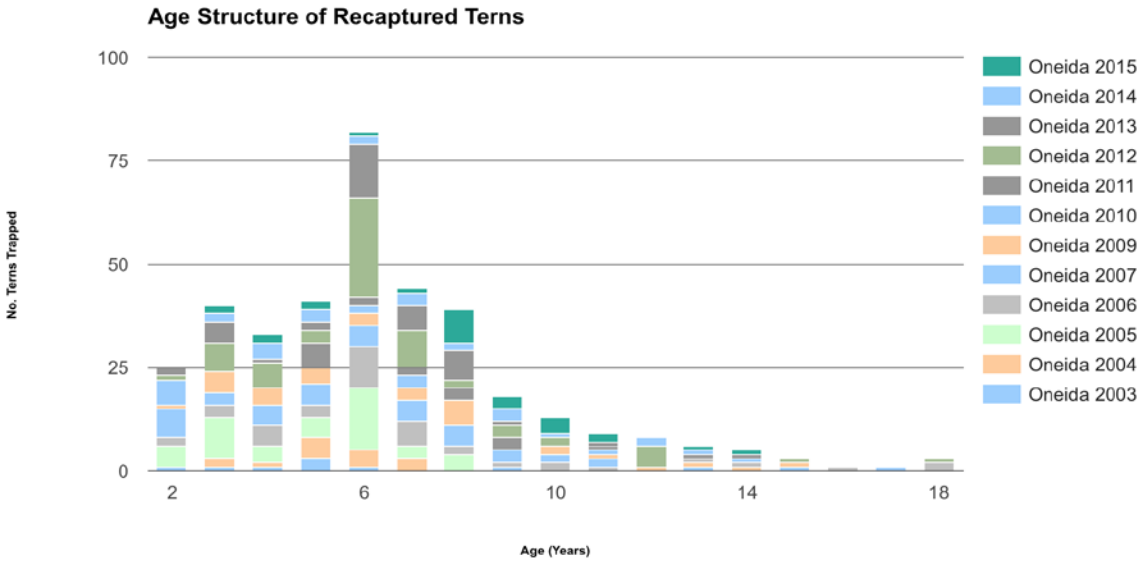

Figure 6. Population age structure for Common Terns recaptured at Oneida Lake, New York, between 2003 and 2015.

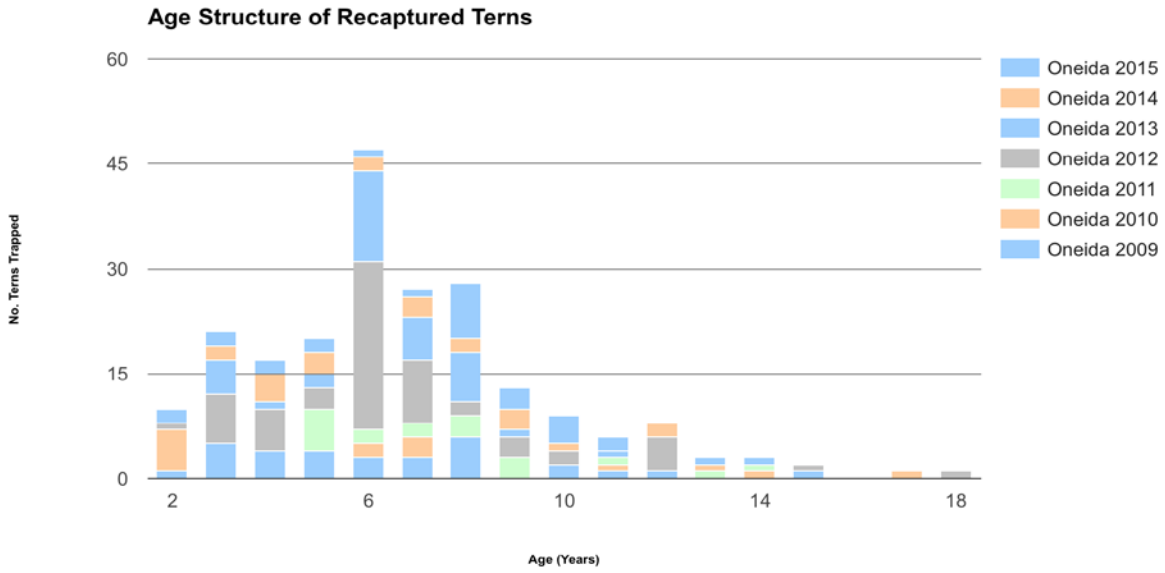

Figure 7. Population age structure for Common Terns recaptured at Oneida Lake, New York, between 2009 and 2015.

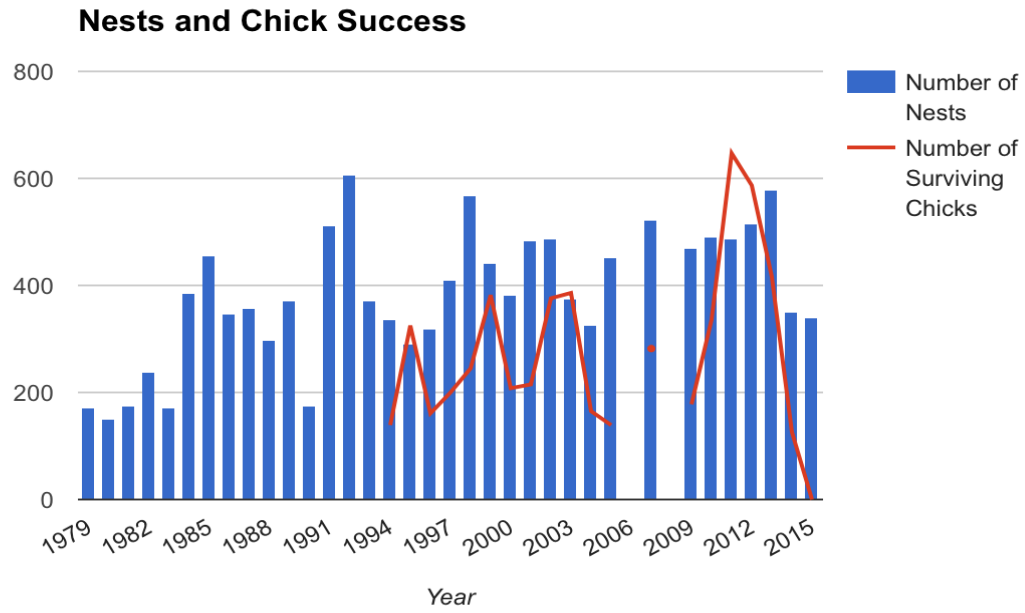

Figure 8. Long-term nest counts and chick survival for Little Island at Oneida Lake, New York.

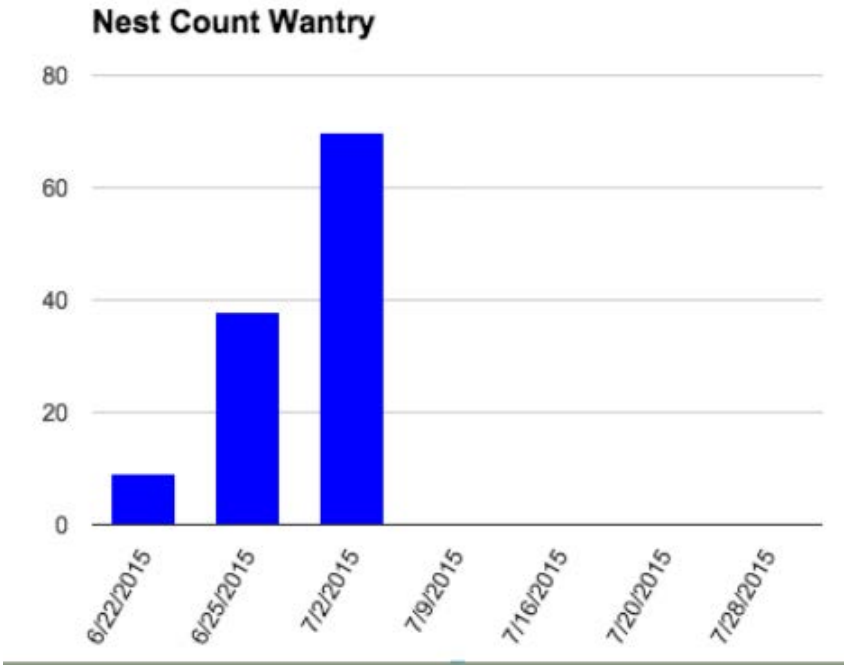

Figure 9. Total nest counts of Common Terns on Wantry Island at Oneida Lake, New York.

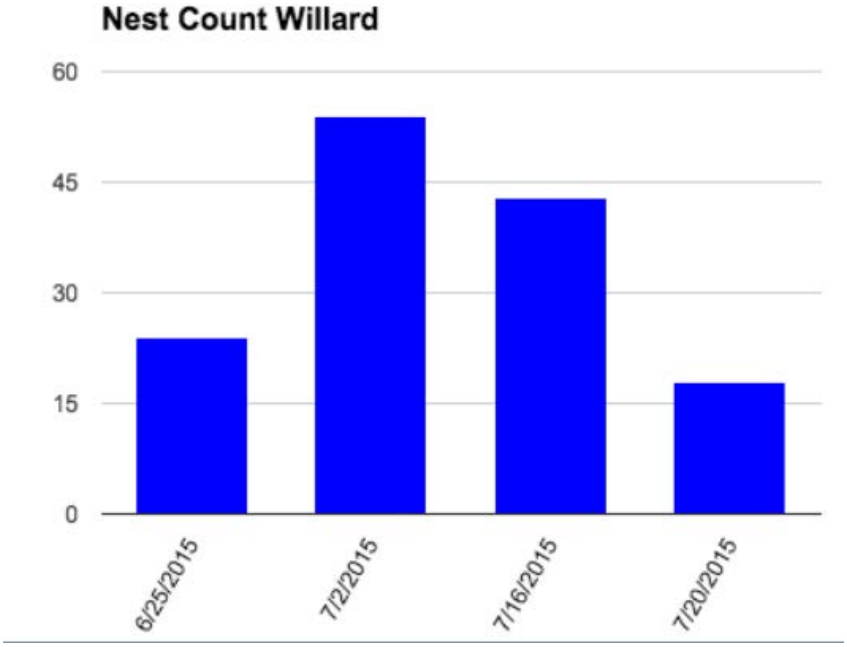

Figure 10. Total nest counts of Common Terns on Willlard Island at Oneida Lake, New York.

Figure 11 - Common Tern egg with signs of predation found during summer 2015 on Little Island at Oneida Lake, New York.

Figure 12 – Great Blue Heron (bottom right corner) causing a flush of terns on Little Island during summer 2015 at Oneida Lake, New York. Image caught by an infrared camera.

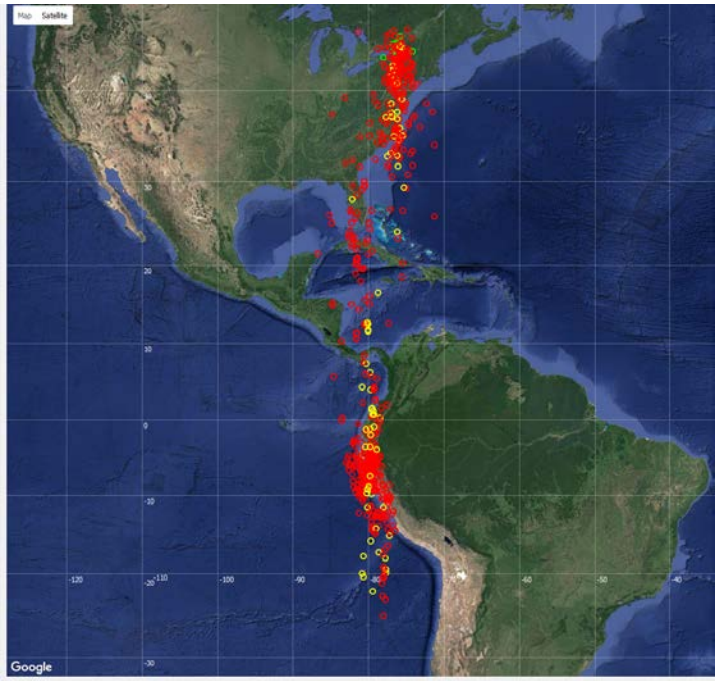

Figure 13 - All data collected from one geolocator placed on a Common Tern during summer 2014, and recaptured summer 2015, on Little Island at Oneida Lake, New York.

Figure 14 - Geolocator data displaying a stopover location of a Common Tern (04/18/2015 - 04/29/2015) from wintering grounds to Chesapeake Bay area.

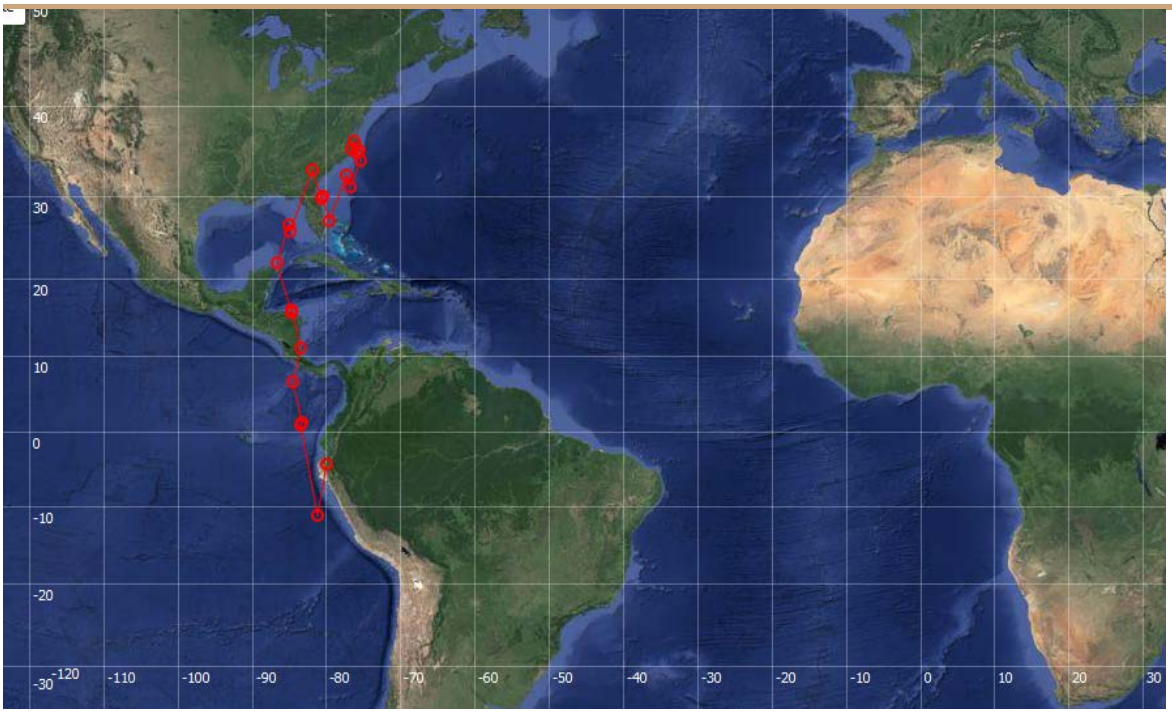

Figure 15 - Geolocator data displaying trajectory of a Common Tern (04/18/2015 - 04/29/2015) from wintering grounds to North Carolina.

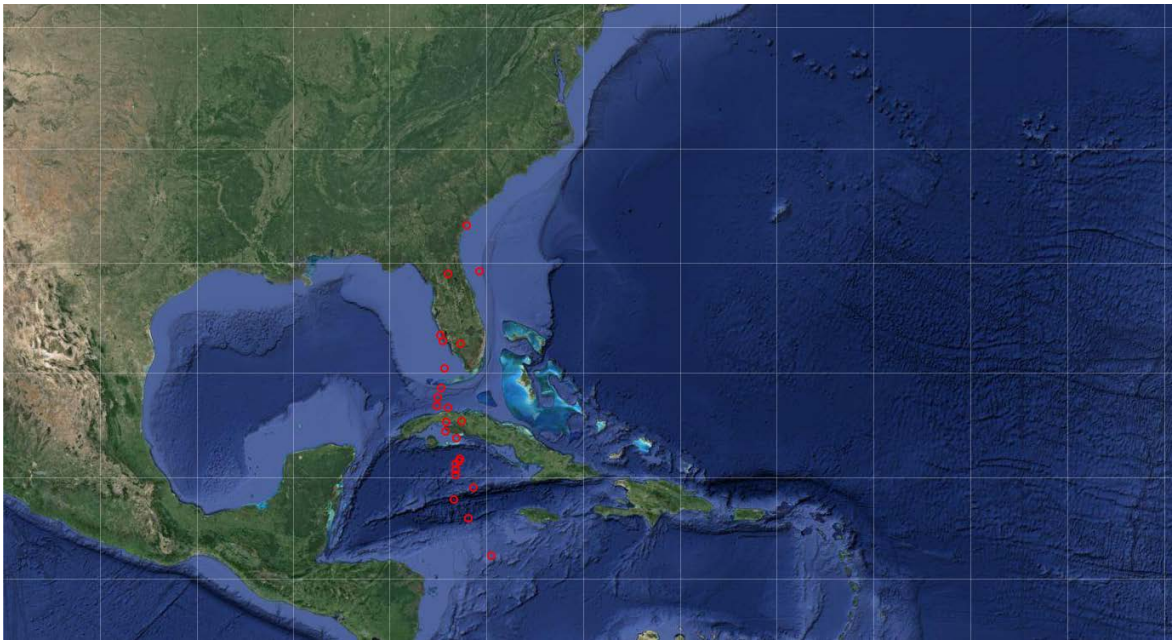

Figure 16 - Geolocator data displaying a stopover location of a Common Tern off the coast of Florida and over Cuba.

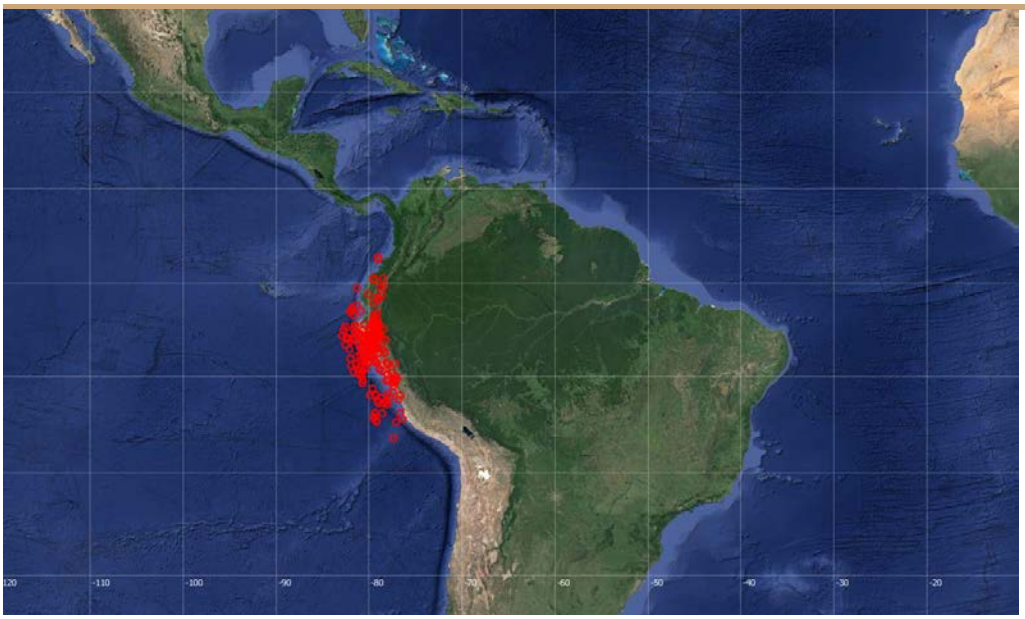

Figure 17 - Geolocator data displaying wintering grounds of a Common Tern (11/06/2014 - 02/19/2014) in Peru.

Figure 18 - A Common Tern decoy found next to a tern nest with eggs during summer 2015 on Wantry Island at Oneida Lake, New York.